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CONTAINER FOR HEAT ACCUMULATING AGENT

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CONTAINER FOR HEAT ACCUMULATING AGENT

[Chikunetsuzai yoki]

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[There are no amendments to this patent.]

Claims

1. A container for a heat accumulating agent, characterized by the fact that several sheets of metallic plates with good heat conductivity are intersected and inserted into a cylindrical container in which a heat accumulating agent composition is housed.

2. The container for a heat accumulating agent of Claim 1, characterized by the fact that several sheets of intersected metallic plates have a cross or multiblade shape on a horizontal section of the container.

3. The container for a heat accumulating agent of Claim 1 or 2, characterized by the fact that the metallic plates have a number of through holes.

Detailed explanation of the invention

The present invention pertains to a container for a heat accumulating agent into which several sheets of metallic plates are intersected and inserted.

In general, the sensible heat or latent heat of a substance is utilized for accumulating heat; however, application of a heat accumulating agent depends on whether the sensible heat is used or the latent heat is used. As heat accumulating agents using sensible heat, water, gravel, crushed stone, etc., are mentioned, and these heat accumulating agents are useful since they can be easily handled, have a large specific heat, and are inexpensive. However, their volume and weight are very large. This is a disadvantage.

On the contrary, as heat accumulating agents using latent heat, crystalline substances of inorganic hydrates, etc., are mentioned. For example, calcium hexahydride chloride, etc., are mentioned. Since they utilize a phase change such as melting at a fixed temperature, the temperature decrease of the heat accumulating agent due to heat radiation is small, and since the latent heat for a phase change such as melting is generally significant, heat can be compactly accumulated. However, if the temperature of these salts is gradually lowered from the melting state or vice versa, extracting heat at a prescribed temperature is delayed, causing a practical inconvenience. Also, since the temperature conduction and convection of a substance in layers is poor, heat radiation is difficult. Therefore, faster heat conduction is needed.

Accordingly, these inventors variously reviewed the above problems to improve heat conduction in layers, and as a result, the problems were found to be solvable by inserting a metal with good heat conductivity into a cylindrical container for housing a heat accumulating agent. In other words, the present invention is a container for a heat accumulating agent characterized by the fact that several sheets of metallic plates with good heat conductivity are intersected and inserted into a cylindrical container in which a heat accumulating agent composition is housed.

Next, the present invention is explained in detail by figures.

In the case of a heat accumulating agent 1 accumulating collected solar heat, it is housed in a cylindrical container 2, and for example, in a method using an air as a heat collecting medium, heated air 4 is transferred to a heat accumulating chamber to heat the container 2 for the heat accumulating agent. Then, in a conventional container (Figure 1) in which only the heat accumulating agent is housed, melting of the heat accumulating agent starts only at the part of the heat accumulating agent in contact with the container wall as a result of heat from the outer periphery of the container for the heat accumulating agent, and the melting is sequentially advances toward the center. However, a very long time is required to finally melt the entire agent

after the melting has advanced. In addition, if the heat accumulating agent in a melted state radiates heat and its temperature is lowered, since the heat conduction is poor, a distinctly nonuniform distribution of the temperature is generated, and for this reason, heat cannot be extracted at a fixed temperature. Thus, several sheets of metallic plates with good heat conductivity such as plates of iron, copper, aluminum, and magnesium are intersected with each other at about the center of a horizontal section of the container and are inserted into the container. For example, as shown in Figure 2, (A) shows two sheets of metallic plates 5 intersecting each other in a cross shape, and (B) shows three sheets of metallic plates 5 intersecting each other in a multiblade pattern with the blades at a 60° spacing. Clearly, four or more sheets of metallic plates can also be used; however, if the number of sheets is too large, the amount of heat accumulating agent housed is decreased, and the cost is also quite high in accordance with the kind of metal, which is not preferable. In the cases shown in Figures 2(A) and (B), the part in contact with the container wall is melted, and the metallic plates 5 are heated by heat transfer from the melted heat accumulating agent 3. Heat is also transferred to the heat accumulating agent in the vicinity of the metallic plates by the heated metallic plates 5, and the vicinity of the metallic plates is melted, so that complete melting is rapidly completed. At the same time, if heat is radiated from the melted heat accumulating agent, heat transfer is fast. Then, when the heat accumulating agent reaches its melting point, the metallic plates act like crystal nuclei, and the heat accumulating agent is crystallized, so heat can be uniformly discharged.

In order to further improve the heat transfer by further improving the convection of the melted heat accumulating agent, holes with a round shape, square shape, star shape, etc., are bored at an appropriate density in part or over all of the metallic plates. These patterns also meet the objective of the present invention (6 in both (A) and (B) of Figure 3).

Thus, melting at a time of heating and solidifying at a time of radiating are smoothly carried out, so that heat is stably exchanged. Thereby, the heat accumulation density is high, and utilization of the heat is very efficient.

Brief description of the figures

Figure 1 is a plan view showing a conventional container for a heat accumulating agent. Figure 2 shows an application example of the container for a heat accumulating agent of the present invention into which metallic plates are inserted. (A) is a plan view showing the use of two sheets of metallic plates, and (B) is a plan view showing the use of three sheets of metallic plates. Figure 3 shows an application example of metallic plates in which holes are bored. (A) shows round holes, and (B) shows square holes.

1 Heat accumulating agent

2 Container

3 Melted heat accumulating agent
4 Hot air
5 Metallic plate
6 Hole

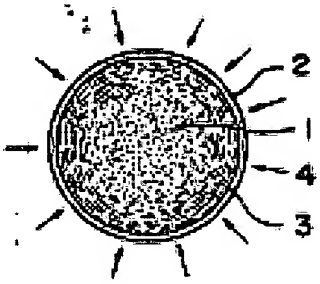

Figure 1

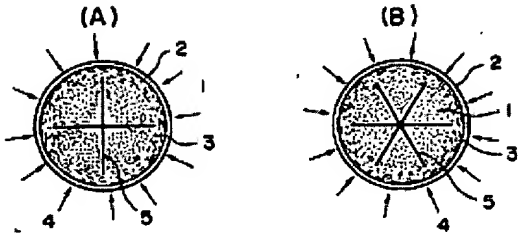

Figure 2

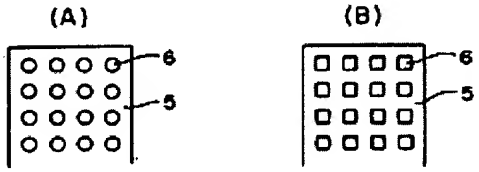

Figure 3